IV. Core Elements

➢ HARVEST

Harvest Management to Meet the Needs of Wild Fish

I. Current Situation: *Where are we now?*

Background

Debate is ongoing about the relative contributions of harvest, hatcheries, hydropower, and habitat factors to the decline of salmonids. Where habitat productivity and access are still adequate and the genetic resources of the wild population have been maintained, providing the sufficient numbers of wild spawners to the stream will recover wild stock abundance rapidly without further assistance. The high reproductive potential allows salmonid stocks to recover to harvestable levels within a few generations (approximately 3 to 15 years). Examples of such recoveries have included upriver bright fall chinook in the Columbia River, fall-run chum outside the Columbia River, summer-run chum in Hood Canal, and coastal cutthroat trout in Puget Sound.

It also appears that wild coho salmon in the lower Columbia River and southwest Washington's Willapa Bay are recovering rapidly or are much more abundant than previously thought. The presence of adipose-clipped, hatchery coho are providing new assessment tools and insights into wild stock abundance and location. But there are many more examples of where stocks have failed or are failing to recover due to habitat loss and degradation. In such cases, recovery strategies will rely heavily on factors other than harvest. The recovery of Mount St. Helens ecosystems has been faster than many predicted, but this is just one example of a single event followed by complete habitat protection whereas many other habitat and access degradations are continual and cumulative (see discussion below - Puget Sound Chinook case study).

Although a number of Washington salmonid populations are experiencing depletions, several populations also have been quite abundant and have surplus production that can be harvested to support the many commercial, cultural, economic and recreational benefits that are traditional Pacific Northwest values. In addition state, tribal and federal agencies invest in significant hatchery production both to help recover wild stocks but also to generate fishery benefits.

To allow sufficient numbers of wild spawners to escape harvest, managers need to be able to determine the total estimated run size and the allowable numbers of fish that can be caught. This determination is complicated by the different productivity levels of the various wild and hatchery stocks. The challenge is the ability of fish managers to target harvest on wild stocks with surplus

production and fish produced for harvest by hatcheries while protecting weaker stocks until their productivity improves. Without such approaches there is little justification for major investments in hatchery programs intended to enhance salmon fisheries.

Managers use the timing and location of runs, gear and size restrictions, and the mass marking of hatchery fish, to target fisheries at healthy species and stocks. The tools to allow targeted fisheries are based on stock identification. Fish scales have been used for years to identify population differences in ages and life history, and are very useful to distinguish hatchery fish released as yearlings. The coded-wire tag has been used since the 1970s to identify primarily the origin of hatchery fish, although limited use with wild stocks has provided insights into factors affecting productivity.

Genetic stock identification (GSI) was put into large scale use in the 1980s to better understand the contributions of various salmon populations to fisheries. DNA methods are currently being developed to expand on the capability of GSI. The use of patterns in the otoliths (ear bones) of fish is a way to mark millions of hatchery salmon prior to hatching by changing the incubation water temperature. Mass removal of hatchery fish adipose fins is the latest identification tool to be used for Pacific salmon, although it has been used for steelhead management for years. This method is unique because it provides a visual mark that allows fishers to selectively retain marked hatchery fish while releasing species and stocks that need protection. Many of these stock identification tools are used together.

Another important component of fish harvest management is understanding the productivity of wild stocks. This requires accurate assessments of the number of spawners, the number of offspring produced (recruits), and sources of mortality, including their contributions to fisheries. Various methods are used with differing success depending on the species. Counting juveniles and adult fish at barriers and/or traps produces the most reliable results.

Spawning ground surveys and redd counts are other indicators that are used. Estimating the number of fish impacted by harvest activities requires tracking reported catch, the amounts of unreported catch, bycatch, dropout rates from nets, predation, and hooking mortality. Estimates of population size and all fisheries-caused mortality are difficult to obtain and require dedicated, costly monitoring efforts.

As stated in Chapter II Background: Setting the Context, salmon production capacity and survival is affected by other human activities such as land use changes impact on freshwater life stages. Many Puget Sound chinook populations are cases in point, where the Department of Fish and Wildlife (WDFW) estimates that as little as 5% of the historic production potential for these populations is represented by total current harvest impacts, including interceptions in Canada. Puget Sound chinook were listed as Threatened under the federal Endangered Species Act in March 1999, and provide a good case study about how habitat and fishery

harvest factors may both limit current status and play a role in future recovery. What the example points out is this: in a case where habitat conditions are limiting factors responsible for depleted population status, harvest restrictions by themselves cannot ensure sustainable recovery. This is because additional spawners in the system do not automatically equate with greater production. A high likelihood of recovery exists only when integrated actions are taken to reduce mortalities throughout the fish's life cycle.

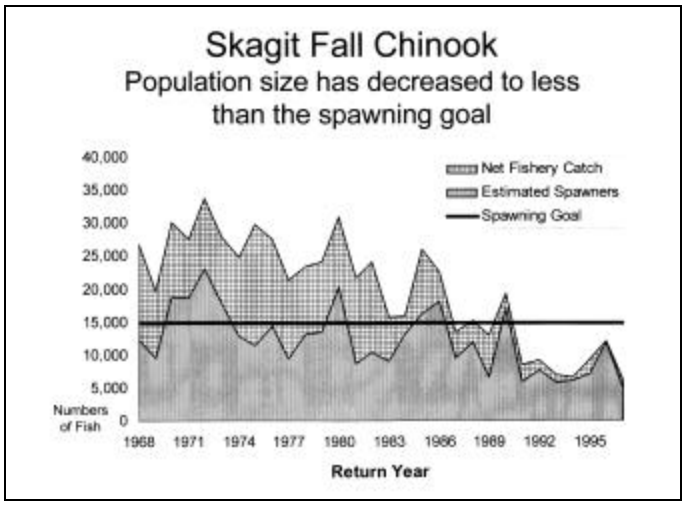
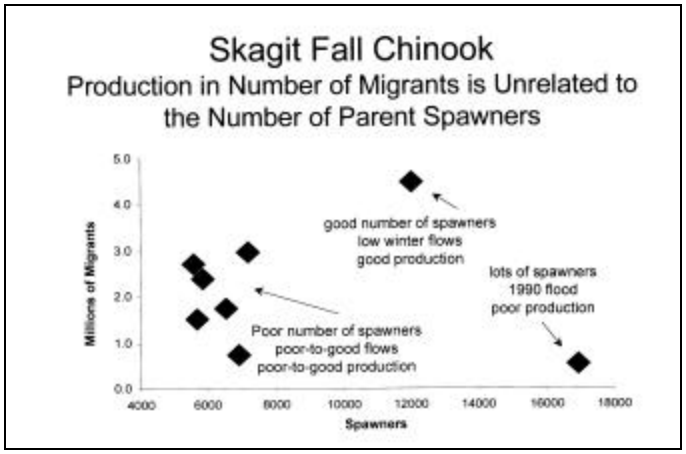


Figure 6. It is extremely important to manage harvest to ensure that a sufficient number of salmon return to spawning grounds. In fact, the proportion of Puget Sound chinook populations that is taken by harvest has fallen dramatically in the past three decades. While figure 6 only displays catches in Puget Sound net fisheries and spawning escapement over time, the same trend exists when looking at total catches and run sizes.

Figure 7. Providing adequate number of spawners may not be as important as the productivity of those spawners in their habitat. For example, there has been little relationship between the number of spawners and the subsequent number of migrating juvenile salmon fall chinook in the Skagit River in recent years.



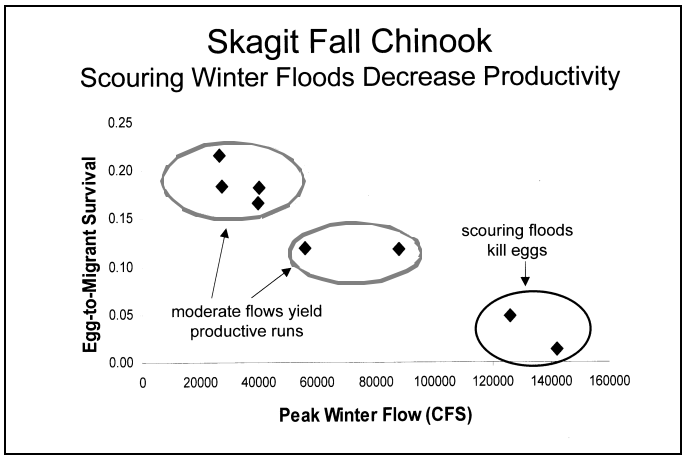
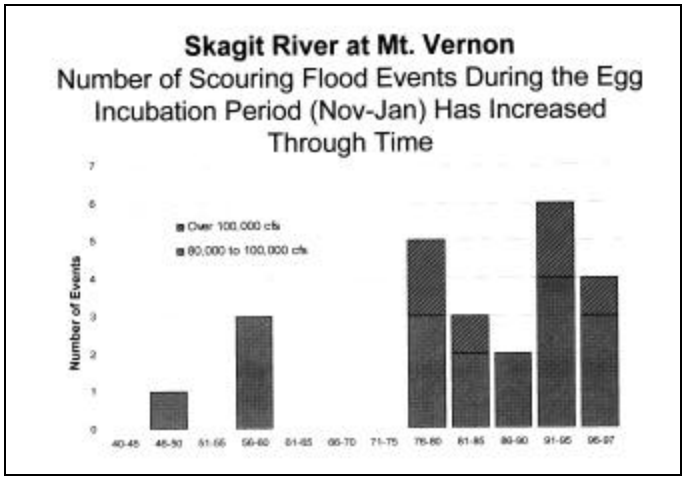


Figure 8. Instead, we see a significant negative relationship between peak Skagit River flows during the critical egg-incubation period and the number of juvenile fall chinook salmon which survive to migrate to sea. Extreme high flows (so-called 100-year floods) scour egg nests and kill salmon eggs.

Figure 9. The number of extreme flooding events in the Skagit River has increased dramatically in the past ten years, increasing the frequency of the so-called 100-year flood to about every five years. Some major causes for increased flooding in Puget Sound watersheds include de-vegetation (logging, clearing for development), which causes rain water to run off rather than slowing it to sink into the soil; increased impervious surfaces (roads, parking lots), which encourage water to run off; and channelization of the river bed (diking), which increases the volume and intensity of flood flows within the river, causing scouring of the river bed.



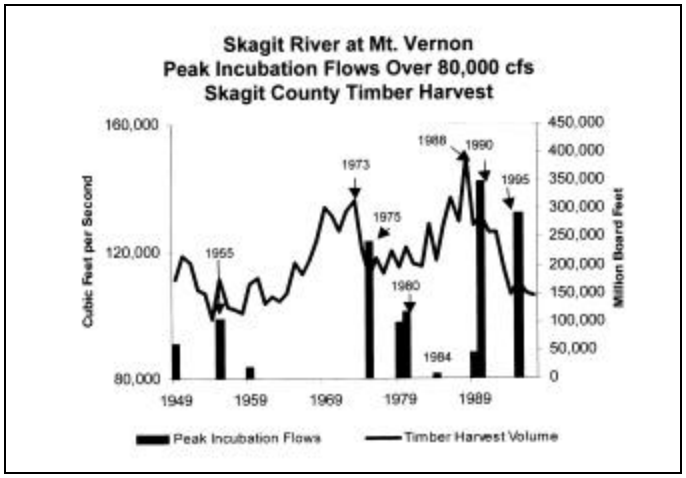


Figure 10. It is not easy to draw simple conclusions about the cause of increased flooding in the Skagit basin, but an examination of timber harvest volumes shows that flooding increases immediately following periods of stepped-up timber harvest. Factors such as these can significantly reduce salmon productivity. In the case of Skagit River fall chinook, rebuilding is inhibited because even when sufficient numbers of salmon reach the spawning grounds, a large proportion of the eggs laid by those spawners often never survive to migrate to the sea.

Summary of recent activities

The Department of Fish and Wildlife, by developing the Wild Salmonid Policy (Harvest and Hatcheries elements are part of the Statewide Strategy to Recover Salmon) is providing substantial commitment to fish management actions that ensure sufficient wild spawners escape fisheries and reach spawning grounds. One important indication of harvest management intent under the Statewide Strategy to Recover Salmon can be seen from recent actions already taken to implement policy directives. A sampling of these actions is presented below:

1. *Comprehensive coho management planning*: Efforts by the state and Puget Sound tribes continue to develop a species management framework for coho with accompanying guidelines on exploitation rates and fishery regimes. This is one of the first salmon species activities in Washington to incorporate harvest, hatchery and habitat issues into one comprehensive plan. Elements of the plan will be carefully evaluated prior to adoption to ensure that wild spawning escapement goals will be consistently met, and that hatcheries are managed to do no harm to wild fish.

2. *Comprehensive chinook*: State and tribal staffs are currently developing a Comprehensive Chinook Management Plan for Puget Sound. This framework will provide the basis for NMFS to develop a A4(d) rule@ under the ESA that authorizes and limits Atake@ that will actively support the recovery of Puget Sound chinook under ESA and further rebuild runs to levels that will provide sustainable harvest opportunities. A comprehensive review and development of appropriate fishery impact guidelines is a cornerstone of this effort. A similar section is being developed that reviews and provides a framework for limiting risks from hatchery programs. The plan will incorporate performance measures and a schedule for periodic review. It also will provide an umbrella for regional and watershed recovery plans being developed at the local level, where the essential ties to adequately managing habitat and hydro activities must be made.

3. *U.S.-Canada Pacific Salmon Treaty*: In 1998 through the Locke/Anderson Agreement@, Washington and Canada broke through a major impasse in the Pacific Salmon Treaty process by striking an agreement that: (1) reduced impacts on Fraser River coho by 22%; (2) reduced impacts on Puget Sound chinook by 50%; (3) will provide Canadian support for Washington's mass marking and selective fisheries initiative; and (4) provides for a more active collaboration between the two countries in planning annual fisheries to protect depleted salmon populations. This breakthrough was followed in 1999 by newly renegotiated fishing agreements between the two countries. The new annex referred to as attachment A significantly reduces Canadian chinook fishery impacts on Puget Sound stocks from the treaty's original provisions in 1985, and establishes for the first time an abundance based approach for determining Canadian coho harvests. See Appendix C for a summary of the U.S. Canada Agreement.

4. *The US v Oregon Columbia River Fisheries Management Plan* is currently being reviewed and negotiated by the state(s), tribes and federal government to implement appropriate changes in harvest and hatchery approaches.

5. Fisheries that differentially harvest healthy stocks or species have been expanded from past years. The first use of the adipose clip mass mark for marine coho salmon sport fisheries occurred in 1998 in the Columbia River and adjacent marine area. In 1999 these selective recreational coho fisheries were expanded to all Washington ocean areas, the Strait of Juan de Fuca and deep South Puget Sound. Fishers are allowed to retain two marked hatchery coho and required to release unmarked, wild coho. These fisheries have been implemented consistent with provisions of a U.S. District Court stipulated agreement between the state and tribes on coho mass marking and selective fisheries.

6. In 1998 and 1999 most chinook retention was prohibited in the Strait of Juan de Fuca and northern Puget Sound fisheries because hatchery and wild fish could not be differentiated. However, several areas in southern Puget Sound, southern Hood Canal and Bellingham/Samish Bays were open to chinook fishing to allow harvest on hatchery chinook. Further, WDFW and the Puget Sound tribes reached conceptual agreement on a chinook mass marking and selective fisheries agreement to be filed with the federal court. Some chinook mass marking commenced in 1999 throughout Puget Sound; similarly mass marking of Lower Columbia River hatchery spring chinook also occurred in 1999.
7. Puget Sound commercial sockeye fisheries in 1998 were constrained to limit impacts on other species, notably chinook. These limitations will continue in 1999 with new fishing measures required to reduce

release mortalities by non-Indian purse seine fishers and a log book program to be implemented in non-Indian commercial fisheries and verified by WDFW on-water bycatch monitoring efforts. A targeted fishery on wild and hatchery Hood Canal coho has been possible in 1998 and 1999 because of strict harvest controls enacted by WDFW and tribal comanagers for summer-run chum salmon and providing adequate levels of wild coho escapement in recent years.

8. *Commercial salmon fishery restructuring*: WDFW, in cooperation with NMFS, completed a $4.5 million salmon license buyback program in 1998 that continued to address the overcapitalization in Washington's commercial fishing industry. The program retired 391 licenses, representing a 17 % reduction in current Puget Sound licenses. Furthermore as a result of recent Pacific Salmon Treaty renegotiations WDFW and the commercial stakeholders are poised to further reduce the commercial fleet to a sustainable level.

9. The Department of Fish and Wildlife (WDFW), as mandated by the legislature, recently completed a report and video to the legislature on the capacity of current and alternative fishing methods and gears to release non-target species with low mortality and transform gear and fishing methods to become more selective in protecting depleted species and stocks. The report included recommendations on approaches to developing more selective gears and generated a commitment by the commercial salmon industry to cooperate with WDFW in development of a selective fisheries implementation plan.

10. *Evaluation of the Strategies for Washington's Wildlife* - Resident Native Fish Program, 1987-1997. This WDFW evaluation describes the activities in implementing the Strategies for Washington's Wildlife Strategic Plan as it relates to the Resident Fish Program. Five major areas were examined including bull trout and Dolly Varden and resident streams and beaver ponds. The report includes assessments of the current status of the resources, major activities and accomplishments, and notes problems and strategies to address in the future.

11. The following WDFW/tribal stock rebuilding plans are completed or under development:
    - < White River spring chinook
    - < Skagit spring chinook
    - < Yakima spring chinook
    - < Dungeness chinook
    - < Nooksack Watershed Plan for chinook
    - < Green River chinook and coho
    - < Lake Washington chinook and steelhead
    - < Upper Columbia River chinook and steelhead

12. *ESA Recovery Plans under development*:
    - < Hood Canal summer chum (WDFW, tribal, NMFS) - also basis for ESA A4(d) rule@
    - < Bull trout (WDFW, USFWS, other states)
    - < Lower Columbia River Steelhead Initiative (WDFW, DOE, various local partners) has built the foundation for associated 4(d) rule development by NMFS

13. *Escapement goal review*: Salmonid escapement goals are now being established, reviewed and revised for specific local stocks throughout the state, including:
    - < lower Columbia River chinook and coho
    - < Snohomish even-year pink
    - < Willapa Bay coho and chinook
    - < Nooksack natural coho

Current Applicable Policies

1. Federal Statutes and Court Decisions

U.S.-Canada Salmon Treaty

The Pacific Salmon Treaty Act (16 U.S.C. 3631) implements the treaty between the U.S. and Canada (signed January 28, 1985) regarding the conservation and management of Pacific salmon. The Pacific Salmon Commission was established as the international organization for implementing the provisions of the treaty, with subsidiary Northern, Southern, and Fraser River Panels. Overall principles of the Treaty include "a) prevent overfishing and provide for optimum production; and b) provide for each party to receive benefits equivalent to the production of salmon originating in its waters." For the various salmon species, management objectives are:

(1) Chinook: provides a long-term abundance-based framework for managing all chinook fisheries subject to the Treaty; introduces harvest regimes that are based on estimates of chinook abundance, that are responsive to changes in chinook production, that take into account all fishery induced mortalities and that are designed to meet MSY or other agreed biologically-based escapement objectives; halts the decline in spawning escapements in depressed chinook salmon stocks; sustains healthy stocks and rebuilds stocks that have yet to achieve MSY or other biologically-based objectives; defines specific obligations of all the various fisheries in maintaining healthy chinook salmon stocks, rebuilding depressed naturally spawning chinook stocks that are not meeting escapement objectives and providing a means for sharing the harvest and the conservation responsibility for chinook stocks coastwide among the Parties; and develops biological information pursuant to an agreed program of work and incorporates that information into the coastwide management regime.@

(2) Fraser River sockeye/pink: obtain spawning escapement goals by stock or stock grouping; meet Treaty defined international allocation; and achieve domestic objectives.@

(3) Coho: constrain total fishery exploitation to enable key management units of natural coho stocks to produce maximum sustainable harvests over the long term while maintaining the genetic and ecological diversity of the component populations; improve long-term prospects for sustaining healthy fisheries in both countries; establish an approach to fishery resource management which is responsive to resource status, cost-effective, and sufficiently flexible to utilize technical capabilities and information as they are developed and approved; and establish an objective basis for monitoring, evaluating and modifying the management regimes as appropriate.

(4) Southern B.C. and Washington chum: The U.S. will harvest chum as provided in Chapter 6, annex IV; linked to Canadian inside run sizes and harvest levels; require live release of chum salmon from Canadian and U.S. non-Indian purse seine gear from August 1 through September 15 each year in order to protect migrating Puget Sound summer chum salmon.

Native American Treaty Fishing Rights - U.S. v Washington - U.S. v Oregon

Federal treaties with Northwest Indian Tribes protected certain fishing rights for these tribes. As a result, the Department cooperatively manages the state's fishery resources with two dozen Treaty Tribes from the Puget Sound, coastal, and Columbia River regions. The Federal Courts have specified the treaty-fishing-right responsibilities of the Department in several major cases (*U.S. v Washington*, *U.S. v Oregon*, *Hoh v Baldrige*), dozens of sub-proceedings and hundreds of Fishery Advisory Boards. For example, the *U.S. v. Washington* (Boldt) Decision set forth treaty Indian/nontreaty sharing (up to 50% of the allowable harvest@), and established tribes as co-managers with the state. A sampling of guidance and court orders relevant to *U.S. v. Washington* includes:

(1) Puget Sound Salmon Management Plan and associated documents, such as Equilibrium Brood, Future Brood, Status Reports, Management Periods, and regional plans, for example:
≡ Hood Canal Salmon Management Plan

(2) Comprehensive Coho Management Plan (in development)

(3) Puget Sound Chinook Comprehensive Rebuilding Plan (in development)

(4) *Hoh v. Baldrige* Order and Management Plan

(5) Annual state-tribal management agreements (for example, as developed through the North of Cape Falcon Process)

Centennial Accord

In 1989, the State of Washington and the twenty-six federally recognized Indian Tribes of Washington entered into the Centennial Accord. This ACCORD illustrates the commitment by the parties to implementation of the *government-to-government relationship*, a relationship reaffirmed as state policy by gubernatorial proclamation January 3, 1989. This relationship respects the sovereign status of the parties, enhances and improves communications between them, and facilitates the resolution of issues.@ (Centennial Accord, 1989)

Endangered Species Act

The Endangered Species Act provides for the conservation of ecosystems upon which threatened and endangered species of fish, wildlife, and plants depend. See Chapter II. Background: Setting the Context.

Pacific Fisheries Management Council and North Pacific Fisheries Management Council:

The Fishery Conservation and Management Act of 1976 (16 U.S.C. 1801-1882), also known as the Magnuson Fishery Conservation and Management Act, established a 200-mile fishery conservation zone, effective March 1, 1977, and established Regional Fishery Management Councils comprised of Federal and State officials. The

concept of a fishery conservation zone was subsequently changed to the Exclusive Economic Zone (EEZ), with the inner boundary being the seaward boundary of the coastal States. The Act provides for management of fish and other species in the EEZ under plans drawn up by the Regional Councils. The Department of Fish and Wildlife represents the state of Washington as a voting member on the Pacific and North Pacific councils, and plays a direct role in the management of our offshore fishery resources.

Salmon fishing seasons throughout Washington are either directly or indirectly set as a result of a month-long public process associated with Pacific Fishery Management Council ocean season setting. Although the Council has jurisdiction for fisheries outside Washington waters in the EEZ, all impacts to salmon stocks must be managed in a coordinated fashion, from the ocean to the spawning grounds. People interested in salmon, from fishers to environmental group representatives, gather in a series of meetings called the North of Cape Falcon process@ at which the complete suite of fishery impacts on each stock can be evaluated against conservation objectives, and fishing seasons be negotiated among stakeholders.

2. State Statutes

RCW 75.08.012, 75.08.080 and 77.04.055- Duties of the Department:
The Department of Fish and Wildlife is charged with the responsibility for both conserving the fish and wildlife resources of the state, and for providing opportunities for the commercial and recreational use of these resources. Within the Department the Fish Management Program is tasked with the management of the fish and shellfish resources and associated fisheries.

In particular, RCW 75.08.012 with regards food fish and shellfish, provides the following Mandate of the Department:

> *The department shall preserve, protect, perpetuate and manage the food fish and shellfish in state waters and offshore waters.*
>
> *The department shall conserve the food fish and shellfish resources in a manner that does not impair the resource. In a manner consistent with this goal, the department shall seek to maintain the economic well-being and stability of the fishing industry in the state. The department shall promote orderly fisheries and shall enhance and improve recreational and commercial fishing in this state.@*

RCW 75.08.500-520 - External Marking of Hatchery-produced Chinook and Coho Salmon:
Directs the Department to develop a program of selective harvest of hatchery-origin salmon by externally marking hatchery salmon.

RCW 75.28.760 - Wild Salmonid Policy:
Directs the Department to establish a wild salmonid policy jointly with the appropriate Indian tribes (*NOTE: The joint State/Tribal Wild Salmonid Policy, and Washington Fish and Wildlife Commission Additional Guidance to Agency Staff are detailed in Section II.).*

Chapter 75.40 RCW - Compacts:
This chapter designates the Department of Fish and Wildlife as the state of Washington's representative to the Columbia River compact and the Pacific Marine Fisheries Compact; it also recognizes the U.S. - Canada Salmon Treaty. The Columbia River Compact is an interstate compact between Washington and Oregon, regarding the management of fisheries in the Columbia River. The Pacific Marine Fisheries Compact is a compact between the states of Alaska, California, Idaho, Oregon and Washington to coordinate fishery management along the west coast. RCW 75.40.060 authorizes the commission to implement provisions of the U.S.-Canada Salmon Treaty.

Chapter 75.50 RCW - Salmon Enhancement Program:
The Department of Fish and Wildlife is directed to produce salmon through projects that enhance salmon and restore habitat. A program of regional fisheries enhancement groups is created and several specific tasks are identified for the Department. The Fish Management Program reviews and approves projects.

Chapter 75.52 RCW - Volunteer Cooperative Fish and Wildlife Enhancement Program:
Creates a program of volunteer projects in cooperation with the Department of Fish and Wildlife. Projects include fish cultural activities, habitat improvement and restoration, and research. The Fish Management Program reviews and approves projects.

Chapter 75.54 RCW - Recreational Salmon and Marine Fish Enhancement Program:
Establishes a program for enhancing the stocks of salmon and marine bottomfish in Puget Sound. Particular emphasis is placed on delayed-release chinook salmon in freshwater pond sites.

3. Washington Fish and Wildlife Commission Mission for WDFW

In 1996, the Commission adopted the agency mission as:

"Sound Stewardship of Fish and Wildlife"

The legislative mandate relating to food fish was incorporated into the Department of Fish and Wildlife's Goals, Policies and Objectives as:

- *Maximum Fishing, Hunting and non-consumptive recreational opportunities compatible with healthy, diverse fish and wildlife populations.*

- *Sustainable Management of Marine Resources to Maintain the Economic Well-being and Stability of the State's Fishing Industry and to Enhance Recreational and Commercial Fishing in State and Offshore Waters.*

4. Key Policies for Annual Preseason Fishery Management Planning - 1999 North of Cape Falcon Policy:

The Department's Wild Salmonid Policy shall guide Department staff in defining the conservation objectives and non-treaty harvest management regimes consistent with meeting treaty harvest rights while striving to ensure that treaty and non-treaty fishers contribute equally to necessary harvest restrictions.

Harvest Management

- *When assessed from a statewide perspective, harvest management of chinook, coho, pink, sockeye and chum salmon shall not be for the exclusive use of either the sport of the commercial fishery.*
- *Marine area harvest management objectives for sockeye, chum and pink stocks, in priority order, are to (1) provide the harvest benefits to the commercial fisheries, and (2) identify and provide meaningful recreational harvest opportunities of healthy wild and hatchery stocks.*
- *The harvest management objectives for chinook and coho stocks, in priority order, are to (1) provide meaningful recreational fishing opportunities, and (2) provide commercial harvest of healthy wild and hatchery stocks.*

Monitoring

- *Fishery participants will be required to comply with monitoring and evaluation programs designed to account for species and population impacts.*

Gear Conflict

- *Recreational and commercial fisheries shall be structured to minim ize gear conflicts. Unanticipated management issues identified in-season shall be resolved by involving the appropriate sport and commercial representatives in a dispute resolution process managed by Department staff.*

Incidental Mortalities:

- *Limits on the incidental mortalities of non-target species will be defined as necessary for commercial and recreational fisheries. Management regimes will include strategies to limit seabird mortalities consistent with the federal Migratory Bird Treaty Act.@*

II. Goal and Objectives: *Where do we want to be?*

Goal:

Protect, restore, and enhance the productivity production, and diversity of wild salmonids and their ecosystems to sustain ceremonial subsistence, commercial, and recreational fisheries, non-consumptive fish benefits, and other related cultural and ecological values.

Objectives:

- Stewardship of salmonid populations will come first in managing the resource.
- Maintaining and increasing the productive capacity of fish habitat will be an absolute requirement and commitment for recovery.
- Hatchery programs will be held to a standard of doing no harm to wild populations, and will be used to aid recovery where appropriate.

- Status and productivity of wild salmonid populations, and their habitats, will be regularly monitored to evaluate the performance of protection and recovery actions.
- Fishery approaches will be implemented and evaluated to protect depleted populations while providing more stable and sustainable access to healthy species and stocks.
- Commercial and recreational fisheries will continue to be restructured to improve their stability, management and profitability.
- Washington will work with Canadian, tribal, federal and other state managers to resolve the interjurisdictional impediments to salmon recovery.

III. Solutions: *What is the route to success?*

Strategic principles and outcomes for protection and recovery
A basic vision of the future necessarily integrates all elements of protection and recovery that must work together to ensure long-term resource health.

1. *Stewardship of salmonid populations will come first in managing the resource.*
This basic principle of ensuring adequate annual wild spawning populations will be a central focus of protection and restoration. Ensuring healthy populations is the first step to providing sustainable fishing opportunity. When faced with uncertainties, managers will err on the side of the resource. Also, so- called hatchery management zones (areas where wild fish were intentionally overharvested so that fisheries could access abundant hatchery fish without fishing selectively) will be converted to emphasize attainment of sufficient numbers of wild spawners.

2. Maintaining and increasing the productive capacity of fish habitat will be an absolute requirement and commitment for recovery.
Current harvest impacts typically only represent a small fraction of the historic production capacity of Washington's wild salmonid populations. Fishery and hatchery actions alone will do little for sustainable recovery in most cases. Determined, effective actions to protect and restore habitat are the key for long-term resource productivity. For example, resolving serious hydropower impacts to salmon and steelhead in the Columbia River is essential for sustainable recovery.

3. Hatchery programs will be held to a standard of doing no harm to wild populations, and will be used to aid recovery where appropriate.
The abundance of fish in the natural habitat is one essential measure of resource health. But these populations also must be genetically diverse and adapted to local spawning and rearing conditions in order to be productive. This requires carefully limiting interbreeding between hatchery and wild fish, as well as minimizing competition, predation, and other negative ecological interactions between them.

4. Status and productivity of wild salmonid populations, and their habitats, will be regularly monitored to evaluate the performance of protection and recovery actions.
Accurate estimates of spawning populations, juvenile production and mortality rates are essential for measuring responses to harvest, hatcheries and habitat actions. This information needs to be correlated with habitat

conditions and productivity. Managers will maintain up-to-date inventories of population and habitat status for various species, e.g., an expanded Salmon/Steelhead Habitat Inventory and Assessment Program (SSHIAP) and a revised Salmon and Steelhead Stock Inventory (SASSI). Mass marking all hatchery fish is an essential assessment tool to positively identify wild adults on spawning grounds and in fisheries as well as monitoring wild juveniles in downstream migrations.

5. Fishery approaches will be implemented and evaluated to protect depleted populations while providing more stable and sustainable access to healthy species and stocks.
Better protection of depleted populations is needed in mixed stock fisheries. This also coincides with the need to provide more compatible, sustainable access to hatchery fish and healthy wild stocks. Selective fisheries for marked hatchery fish will be emphasized as a management strategy. When stocks are predicted to return below established adult spawning goals, fishery managers will follow guidelines for minimizing incidental fishery impacts.

6. Commercial and recreational fisheries will continue to be restructured to improve their stability, management and profitability.
Selective fisheries for marked hatchery fish are already being implemented as a recreational fishery strategy. New gears and methods that allow selective capture and release of depleted species/stocks will be promoted in commercial salmon fisheries. Commercial license buy back will be used to reduce fleet sizes and thereby increase manageability and profitability.

7. Washington will work with Canadian, tribal, federal and other state managers to resolve the inter-jurisdictional impediments to salmon recovery.
A large share of the harvest of Washington salmon stocks historically has occurred in Canada and Alaska, and new Pacific Salmon Treaty provisions are expected to reduce outside interceptions to complement state conservation actions. In addition, state and tribal co-managers are committed to reviewing existing management agreements, and modifying as appropriate, to ensure effective harvest and hatchery management measures are enacted to protect wild stocks.

Highlights of Wild Salmonid Policy population management guidelines
Numerous strategies have been identified to implement this protection and recovery vision. While not presented in detail here, some highlights of the Wild Salmonid Policy (WSP) are presented below, as it represents essential guidance for the full range of implementation activities being pursued by WDFW, tribal and other state and federal managers. The Wild Salmonid Policy and additional staff guidance, although not included in their full detail here, are fully incorporated in the Statewide Salmon Recovery Strategy by their reference here. Discussing those policies that pertain directly to harvest does not imply that these actions alone can recover and maintain healthy wild salmonid populations.

Note: *The Final Environmental Impact Statement (FEIS) for the Wild Salmonid Policy contains the complete policy alternative (Alternative 3) that was adopted by the WDFW's Fish and Wildlife Commission, including the essential habitat elements. The policies contained in the WSP were developed to work in concert across the elements, i.e., habitat, harvest, hatcheries and hydro. The supporting background for the interrelationships of these elements and the rationale for choice of Alternative 3 are*

contained in the Appendices to the FEIS. This material presents important information on the requirements of healthy salmonid populations and can be easily accessed at WDFW's website (http:www.wa.gov/wdfw/).

1. Goal of the Wild Salmonid Policy

> "THE GOAL OF THIS WILD SALMONID POLICY IS TO PROTECT, RESTORE, AND ENHANCE THE PRODUCTIVITY, PRODUCTION, AND DIVERSITY OF WILD SALMONIDS AND THEIR ECOSYSTEMS TO SUSTAIN CEREMONIAL, SUBSISTENCE, COMMERCIAL, AND RECREATIONAL FISHERIES, NON-CONSUMPTIVE FISH BENEFITS, AND OTHER RELATED CULTURAL AND ECOLOGICAL VALUES."

The Wild Salmonid Policy (WSP), adopted on December 5, 1997, by the Washington Fish and Wildlife Commission (Commission) is the blueprint for ensuring fish population management (harvest and hatcheries) and habitat management meet the needs of wild fish. The WSP is comprised of two documents. One contains policy provisions developed jointly with many Western Washington Treaty Tribes. The second part is a complementary document that contains additional Department of Fish and Wildlife Commission policy guidance to WDFW staff on deferred issues to be resolved at the watershed level throughout Washington. Although the Treaty Tribes have not formally "signed on", the policy is being integrated into the regular management forums with individual tribes. Implementation at the local watershed level with comanagers and local governments is the level where significant progress is being made. Beginning in December, 1997, biologists in the Department of Fish and Wildlife began incorporating the guidance of the WSP into daily management decisions.

2. Summary of joint policies on harvest (excerpted from the WSP):

a. *Framework for Implementation of joint policy for fish populations, escapement, harvest management, and hatcheries:* (#1) The fishery and hatchery management principles that are stated in this joint policy shall be implemented by affected signatory tribal parties and WDFW, who shall cooperatively review and, where there is agreement, jointly amend management agreements and plans relating to affected fisheries. Such review and agreements shall utilize best available science and be made with appropriate consultation with affected stockholders.

b. *Spawner Escapement Policy:* (#2) AThe wild populations or management units to which this spawner escapement policy applies will be defined on a comprehensive, statewide, or regional basis, recognizing scientific uncertainty, in accordance with policy statement #1. The parties will review existing court orders, joint agreements, and management plans to determine if it is agreed whether modifications are necessary to be consistent with the goals of this policy. Within this context, sufficient escapement of appropriate naturally spawning fish will be provided to encourage local adaptation and maximize long-term surplus production that sustains harvest, and to provide for recreational opportunities and ecological benefits. Exceptions to this general policy may be developed on a regional basis through agreement of the Department and affected Tribes to provide for recovery and rebuilding of wild stocks or where natural productivity is low.@

c. *Hatchery Fish and Spawner Abundance:* (#2, continued) Where hatchery fish are cultured to augment the naturally produced population in a stream, spawning of hatchery origin adults beyond what is needed for broodstock will be evaluated through a case-by-case analysis of the effects on the naturally spawning stock

characteristics. However, the goal would be to develop harvest strategies that optimize harvest on the hatchery production and hatchery production strategies that are consistent with section 6 of this Policy and protect naturally spawning populations.

d. *Conserving Genetic Diversity Policy:* (#3) Genetic diversity within and among stocks will be maintained or increased to encourage local adaptation and sustain and maximize long-term productivity. Conditions will be created that allow natural patterns of genetic diversity and local adaptation to occur and evolve.@

e. *Ecological Interactions Policy:* (#4) Wild salmonid stocks will be maintained at levels that naturally sustain ecosystem processes and diverse indigenous species and their habitats.
Healthy populations of other indigenous species will be maintained within levels that sustain or promote abundant wild salmonid populations and their habitats.

f. *Harvest Management Policy:* (#5) The fisheries will be managed to meet the spawning escapement policy as well as genetic conservation and ecological interaction policies.

g. *Continued Public Input and Science Upgrades:* (#16) This policy reflects Department and Tribal Parties' consideration of the best science and public input that could be agreed to and incorporated at this time. The Department and Tribal governments believe that this Policy identifies important Fish Management and Habitat parameters and frameworks that will lead to rebuilding of salmonid stocks. However, the Department and Tribal parties intend that this Policy be a living document, to be updated with improved science as it is developed.

3. Summary of additional harvest policy guidance
The concept in policy statement #16 is also key to resolving differences among WDFW, individual tribes and other managers. The policy is intended to adapt to new science and information over time and WDFW is committed to such review, including specific forums and workshops that could facilitate analysis of specific policy elements. An expectation is that over time the differences between the state and tribes' joint policy and the Commission's additional policy guidance to WDFW staff will narrow based on information gained through implementation of the policy and other evaluation, research and monitoring activities.

In addition to this joint commitment to updating the policy with improved science, the additional staff guidance further recognizes the need to work through potential policy differences with tribal and other managers, as well as emphasizes the need to work closely with the public. The implementation of the policy and additional staff guidance clearly is expected to occur through thoughtful, collaborative processes and *not* as a result of unilateral approaches. The current record of implementation activities indicates a significant measure of success in meeting this implementation intent. Relevant process guidance in this area includes:

- *Further description of legal authority and additional implementation guidance:* The Wild Salmonid Policy provides the standards and goals to be applied in harvest, genetics, hatchery, and habitat protection programs. Where the Department and all tribes could not reach a common goal or standard, the Department and tribes deferred further agreement and discussion to the particular watersheds and tribal regions. This approach preserves to the Department and tribes the prerogative

to provide additional fishery management guidance, directives, or policies that would better address the needs and situations in specific watersheds and regions.

- *Using this guidance to work with tribal management of treaty fishing rights:* WDFW staff should be aware that the additional guidance is not endorsed by tribal governments, although individual tribes may use or support provisions herein. The additional management goals and standards should then be pursued if preceded by review of the relevant facts and management oversight for resolving issues with tribal fishery management. In doing so, staff must consider whether applicable court orders affect the Department guidance and consider how the Department can use existing court frameworks and processes to modify and improve protection of wild salmonids through agreed management with tribes.

- *Involving citizens and working with other governments:* WDFW staff shall involve public citizens in watersheds as provided herein, and work with Oregon, and interstate and international forums in the manner described.

NOTE: Very specific descriptions of legal authority and guidance to WDFW staff on co-manager and public involvement are included in the policy.

Excerpts of key additional policy guidance related to harvest are included below.

1. Wild Spawning Escapement. Department staff will review its management and co-management actions to ensure that harvest or hatchery programs do not prevent consistent return of the wild spawners needed to utilize available fish habitat. Department professional staff should use spawning escapement science that is crafted from the observed performance of state and tribal fish managers when they have consistently put adequate numbers of viable wild fish on the spawning grounds over the past two decades. To achieve spawning escapement policies, the Department should be conservative in proportion to the uncertainties that exist in the fish population management process.

2. Use of Incidental Catch Limits. The Department should seek to implement a stock-specific 10% incidental catch limitation for current primary stocks when individual annual runs are projected to return at levels below prevailing (and attainable) spawning escapement requirements. The 10% will be calculated in terms of adult equivalents to make its use feasible in chinook salmon management. Past experience and the experience of others show that a specific and objective constraint on incidental catch should be used to ensure proper escapement.[1]

3. Rebuilding populations in hatchery management zones. Current secondary stocks will be subject to specific rebuilding strategies. The goal for hatchery fish management areas is to transform these areas into productive wild fish areas using harvest and habitat strategies.

[1] The intent of the incidental catch guidance is to minimize fishery impacts on stocks needing protection. Analogous approaches that control overall exploitation impacts are being explored for a number of populations as potential surrogates.

4. Use of marked hatchery fish and selective fisheries. Mass marking and a mixture of non-selective and selective fisheries should be used in future Pacific salmon management. The Department should continue to make use of a hatchery program consistent with other elements of policy and to allow selective fisheries, where a high abundance of hatchery fish will be necessary to ensure success. However, future hatchery programs should be made consistent with the needs of wild salmonid populations as described in the WSP.

5. Genetic review of populations. The Department should use quantified genetics-based standards to safeguard the future health of wild salmonid populations. The long-term declines in average size and age composition of many salmon populations have reduced both their reproductive and adaptive potential and their monetary value in the commercial marketplace. The genetically-based minimum spawner abundance numbers described in this policy guidance are not a replacement for MSY escapement objectives. Instead, these minimum spawner numbers are intended only to protect the genetic material of locally adapted populations, not as a substitute for ensuring use of available habitat or for protecting small populations from risks of natural mortalities that take increased percentages of smaller populations and create risks of extinction. Stock transfers and the breeding of hatchery fish in the wild should be controlled to promote local adaptation and to maximize the productivity of wild populations.

Implementation Actions

Although harvest implementation actions are not a focus of this draft of the Statewide Salmon Recovery Strategy, certainly they define the changing face of fishery management, and describe how we intend to meet the obligations outlined in the WSP.

1. Short-term implementation:

Short-term implementation will revolve around ESA compliance as well as further implementation of WSP objectives for example:

$ ESA compliance efforts –See section IV.

$ During 1999 and 2000, transitional management plans will be completed for lower Columbia River coho and chinook, Willapa Bay coho and chinook, Nooksack coho, and South Sound coho and chinook that outline specific timelines for specific harvest and hatchery actions that will meet Wild Salmonid Policy intent.

$ Implementation of chinook mass marking will continue during 1999 and 2000 for major portions of Washington with the new mass marking machines being put into use. Selective fisheries will be implemented for marked hatchery coho. A comprehensive coho management plan will be fully evaluated for adoption.

$ The commercial license buyback, begun in 1998, will be continued and expanded with plans developed for addition license reduction, pending additional funds.

$ Incentives and opportunities for selective commercial fisheries will be implemented in several areas throughout the state; effectiveness of new approaches will be evaluated, with use of increased bycatch monitoring.

$ The Salmon and Steelhead Stock Inventory (SASSI) will be updated by the end of the year. Plans will be implemented to link habitat inventory and assessment data with population status information through an integrated SSHIAP/SASSI system.

2. Long-term implementation:

Long-term implementation will revolve around further implementation of WSP objectives and may include restructuring of recreational and commercial fisheries to increase selective ability to protect depleted stocks and species while improving sustainable access to hatchery fish and healthy species; and new statewide smolt monitoring and habitat inventory programs to provide the tools to measure performance of specific habitat, hydropower, harvest and hatchery actions.

IV. Monitoring and Adaptive Management: *Are we making progress?*

Fishery and population monitoring

1. Fish population assessment methodology - tracking recovery

The goal of this recovery strategy is to ensure that natural production of wild salmonids is maintained and increased. Progress in recovery ultimately will be determined by an abundance of naturally produced salmonids in functional ecosystems that are well adapted and have high reproductive performance. Management actions designed to promote natural life history patterns, characteristics, and genetic diversity are key parts of recovery. All kinds of planning can occur, restoration activities can proceed, management actions can be implemented, and parameters can be measured, but if the number of wild spawners returning to spawning grounds does not improve, recovery will not have occurred.

Fish managers have a variety of tools available with which to evaluate stock status and rebuilding. Two basic monitoring elements are annual enumerations of adult spawner abundance relative to the spawner escapement goals, and measures of stock productivity such as the amount of fish from a particular stock that is harvested and the numbers of juvenile fish produced. For these measures to be meaningful, managers must, first, determine appropriate spawner escapement goals and calculate the potential productivity of each stock in existing habitat.

Updates of the Salmon and Steelhead Stock Inventory (SASSI) provide another essential tool to measure progress and effectiveness of harvest management changes. If the number and distribution of wild production types increases over previous SASSI versions, and the proportion of depressed and unknown status stocks in each ESU decreases, that result would represent positive progress toward rebuilding.

In addition, recovery progress can be measured by the reduction of risks and hazards identified in the Wild Salmonid Policy and other recovery and comprehensive management plans. For example, if the size and age decline of salmonids is being caused by fishing practices, then management changes which reduce the pressures for decline can be monitored by the reduced risk to stocks where those management actions have taken place.

Also, changes and responses to harvest management actions among populations could be measured by protecting some populations from harvest effects using a sanctuary approach.

Key components for measurement are:

- $ Accurate catch and bycatch accounting;
- $ Enumeration of spawners;
- $ Differentiation of hatchery and wild origin fish in fisheries and on the spawning grounds;
- $ Measurements of juvenile and adult freshwater and marine survival/production;
- $ Adequate sampling; and
- $ Evaluation of genetic characteristics.

2. Catch accounting

The ability to monitor the impacts of fishing (including both landed harvest and non-landed mortality) while conserving specific stocks all depends upon accurate catch accounting. It is also an important component, along with tagging information, to determine wild stock productivity, effectively target fisheries, and comply with allocation agreements. Presently, catch estimates often do not provide a complete accounting of total impacts for a particular stock due to the wide range of fisheries that impact wild stocks, the amount of unreported and discarded catch, and other catch reporting challenges. This can lead to underestimates of both exploitation rates and productivity for wild stocks. The monitoring and evaluation of wild salmonid productivity can not be complete without accurate information on harvest.

3. Spawner enumeration

The key measurement of the success or failure of a recovery strategy is the number of wild spawners sustained over time. The first task is to identify locations and methods to better enumerate the number of spawning adults each spawning season. An additional need is to evaluate expected increases in productivity of stocks in river systems where management objectives are being converted from hatchery to wild harvest rates (those areas where wild fish intentionally had been overharvested so that fisheries could access abundant hatchery stocks without fishing selectively). The progress towards becoming more locally adapted and reestablishment of natural genetic diversity patterns can be evaluated by molecular tests and changes in stock fitness.

Adult abundance can also be difficult to assess and even more difficult to predict. The key to furthering an understanding of adult abundance is accurate enumeration of spawners and quantifiable accounting of harvest. Adult enumeration is best for migratory species where natural and constructed barriers with fishways are present.

4. Identifying hatchery and wild origin salmonids in fisheries and on spawning grounds

Wild stock abundance can be masked by the presence of hatchery fish. No consistent method is currently available to differentiate between natural origin salmonids and the progeny of hatchery fish which spawn in the wild. The presence of hatchery adults in freshwater and the magnitude of hatchery releases have been enough to cause NMFS to postulate that true wild stocks could be much less abundant than measures indicate. The preponderance of mixed stock origin and composite production stocks in SASSI, and the proliferation of small-scale enhancement projects, are two examples of why there is concern about the masking of wild stock abundance.

Continued mixed-stock harvest may depend on the ability to identify, and then differentially harvest, hatchery stocks. Both intrinsic and extrinsic markers have been key to fisheries management, and the ability to identify the life-stage, species, and sex have been used to evaluate and shape the harvest of fish and wildlife species for many years. The removal of the adipose fin from coho and chinook salmon (as has been done with steelhead for years) is proving to be very useful to monitor and evaluate harvest, especially when coupled with other stock identification tools such as the coded-wire tag, otolith marks, scale analysis, and genetic stock identification. Adequate sampling in fisheries and on the spawning grounds is critical to the success of these identification methods.

5. Assessment of juvenile and adult natural production

Estimates of both freshwater and marine production must be made in order to assess whether abundance and productivity are increasing, and to identify at which life cycle stage survival is most limiting. These data are key in determining which conservation and rehabilitation tools should be implemented to benefit specific wild salmonids populations. For example, in a river system where juvenile survival is low due to scouring floods during egg incubation, actions to decrease the frequency and severity of scouring floods would most benefit that population. However, if marine survival is the limiting factor, then harvest-related actions may be more appropriate.

Juvenile production is poorly understood and the effects of poor juvenile survival generally have been underestimated. Limitations to natural juvenile production include insufficient number of spawners, genetic and behavioral makeup of adults, excessive winter flows, limited summer flows, passage, environmental constraints, lack of nutrients, and the abundance of pathogens and predators. The relative importance of limiting factors to freshwater production has been the focus of debate based on very little actual data. That is why effective monitoring and evaluation of juvenile production is so important to wild salmonid recovery.

When monitoring productivity, each salmonid species presents different monitoring and evaluation challenges. The first step in monitoring productivity is to select a sufficient number and distribution of sites to assess freshwater and, for species that use marine waters for transition, marine production. Counting the migratory smolts and adults at weirs gives the most comprehensive estimates of natural productivity for anadromous species.

Traps at natural and artificial barriers and fish ladders can be used to estimate population abundances. In some instances weirs were built in small streams for the enumeration of adults and juveniles. Another very effective technology has been floating smolt traps used in medium to large river systems. Other methods such as mark-recapture, spawning ground surveys and snorkeling are useful for some species. Because many stocks have similar productivities, life-history patterns and abundance fluctuations, monitoring sites can be used to estimate wild fish abundance for larger geographical areas. *Because suitable monitoring locations are limited, they should be identified prior to the establishment of habitat monitoring and evaluation locations to ensure that changes in habitat parameters can be compared to changes in salmonid production. It is extremely important to develop complementary population and habitat monitoring approaches.*

A limited number of wild production assessment sites are currently in place. These need to be expanded to document wild salmonid abundance and also correlate productivity with environmental conditions. Results from

past work indicate that different stream systems and different species have different correlations with various limiting factors. For example, wild salmonid production is significantly influenced by high winter flows, low summer flows, and flows during spawning.

6. Evaluating and monitoring genetic characteristics

Evaluating and monitoring genetic characteristics involves identifying the amount of successful reproduction between different groups of fish. This information can be used to define distinct stocks and determine the structure of genetic diversity within a species. It also can be used to examine changes to within and among stock genetic diversity through factors such as reduced population sizes and the variance of reproductive performance.

Genetic tools have proven to be very useful in understanding the effects of past fish management practices (such as the determining whether a current population is native or not). The patterns of genetic diversity relate to the amount of local adaptation. For example, if numerous strays are observed spawning with a local stock but genetic distinctness prevails, the reproductive success of the strays must be low. This situation may mean that the effects of the strays is negligible, but would also mean that any interbreeding between the local population and the strays results in a decreased productivity of the local stock. Advances in genetic technology continues to improve and is allowing further insights into the interactions of wild and hatchery salmonids.

In addition to molecular measures of genetic variation, quantitative genetic characteristics and heritable life history traits are also important to document. Salmonids typically have a large amount of additive genetic variation that, when coupled with the relatively high reproductive potential (lots of eggs) and a low likelihood of any juvenile surviving to spawn, can result in rapid changes in stock attributes such as fish size, run timing and age at reproduction. When these traits are primarily shaped by nonrandom harvest in fisheries instead of local adaptation pressures, the productivity of the stock will decline. Rebuilding programs need to monitor and evaluate the effects of fisheries on life-history characteristics if fish are expected to be more successful at spawning naturally.

7. Specific actions in the three monitoring and evaluation categories follows:

<u>Implementation</u>

$ identify a sufficient number of natural production monitoring sites in each ESU
$ review SASSI stock designations and determine additional data needs
$ monitor fishery impacts on populations and associated biological characteristics
$ review the effectiveness of existing recovery programs
$ establish spawning goals for stocks in all areas that have existing or recoverable habitat
$ assess the watershed distribution of juveniles and adults
$ examine the diversity of genetics and life-history characteristics
$ compare program modification pace with time lines

<u>Effectiveness</u>

$ annual determination of changes in the stock status of wild fish populations statewide - SASSI update
$ annual reviews of recovery program effectiveness towards goal of ending the need for a particular activity
$ contrast stock status with recovery plan expectations

$ determine if changes in stock life-history attributes lead to increased productivity
$ evaluate the effectiveness of targeted fisheries at providing harvest while protecting certain stocks

Validation
$ examine the freshwater productivity and marine survival of selected wild stocks
$ examine the reproductive success of adults produced through recovery programs
$ determine if harvest rate changes are sufficient to meet rebuilding time frames
$ ascertain if fishery benefits have changed due to wild stock recovery efforts
$ evaluate the harvest rate and distribution information provided from CWT indicator stock or other programs.

Default Actions

If strategies designed to protect and/or restore wild salmonids are not successful, based on information collected and analyzed through monitoring and evaluation program, then alternative actions need to be taken. The type of response must be directed at those factors limiting recovery. For instance, if a fishery management action has had its expected effect but spawning populations are not increasing because habitat productivity is degraded, the need for more effective habitat protection and/or restoration strategies would be indicated. This highlights the critical need to implement and evaluate integrated harvest, hatchery and habitat actions where cause and effect responses can be measured.

In any case, the default actions outlined below assume that the harvest or monitoring action is not having its desired effect or is not being implemented as planned. The magnitude of response in such a case necessarily would relate to the level of attendant risk and uncertainty toward meeting desired recovery objectives. In many cases, severe harvest restrictions already have been implemented in numerous salmonid fisheries, and the only alternative available for increased protection would be complete closure.

If for some reason, state and tribal managers did not meet their commitments and obligations as outlined in this chapter, the most severe consequence would occur in areas affected by ESA listings. In these areas, actions by the fishery managers would not be in compliance with associated take permits or exemptions. These permits or allowances presumably would be relinquished until the fishery managers implemented and enforced the appropriate restrictions or closures. In addition to federal oversight, fishery monitoring and evaluation information will be readily available for an open public review of performance.

1. Spawner escapement policy

The Wild Salmonid Policy requires continual performance monitoring and adjustments of spawning escapement goals to ensure that they are appropriate for maintaining healthy, self-sustaining populations of wild salmonids, given necessary habitat conditions. If the goals are not meeting this intent, then they will be modified accordingly and management plans adopted ensuring compliance, including further fishery restrictions or closures if appropriate. In cases where major changes are being made to past escapement goals (i.e., changing from hatchery to wild harvest rates), an implementation plan and schedule will be adopted as directed in this policy.

The other component of spawning policy relates to the diversity and adaption of local populations to their habitats. If monitoring indicates genetic selection is impeding achievement of these objectives, then modification

to fishery regulations will be implemented as appropriate. Changes in hatchery and habitat management strategies may also be indicated.

2. Differential harvest strategies for hatchery and wild fish

Both the Wild Salmonid Policy and legislative mandate requires mass marking of hatchery fish to ensure performance assessment of hatchery management guidelines and provide for selective fishery opportunities. These mass marking and selective fishery programs are being adopted under joint agreements and/or federal court stipulations with the tribes.

If these marking programs cannot be successfully implemented, then: (a) hatchery programs to augment salmon harvest likely will be proposed to be modified or discontinued, with funds being alternately reprogrammed to support other fishery enhancement or wild salmonid recovery activities; (b) programs to coded-wire tag hatchery fish as surrogates to estimate fishery exploitation rates and survival of wild stocks will be reevaluated if hatchery releases are reduced or discontinued in some areas; and (c) recreational and non-Indian commercial fisheries that rely upon hatchery chinook and coho will be limited by varying degrees by their ability to selectively harvest available hatchery fish, resulting in some economic loss to Washington chinook and coho fisheries.

These fisheries now total at least $55 million annually, not including economic benefit to support industries and communities. The areas most impacted by harvest limits would tend to be smaller coastal communities that rely heavily on fishery, logging and tourism income.

3. Population monitoring

If adequate funding does not become available for WDFW, or cooperating managers and groups, to monitor responses in fish population abundance/biological characteristics, habitat quality/quantity and ecosystem health, then a sound foundation will not exist for evaluating performance of recovery programs. In ESA listed areas, where uncertainty of recovery is high, lack of adequate monitoring would mean that no viable recovery plans would be deliverable or acceptable to the federal government or reviewing courts.

The consequence of this could be severe restrictions of all activities affecting fish population status, including land/water use, harvest, hatcheries and hydropower. Strict regulation would replace adaptive management strategies. Where the uncertainties of recovery are not as great (lower risk or well proven actions), intensive monitoring may not be as critical. Generally, funding needs are identified that already take this risk and uncertainty into account.

4. Fishery impact assessment

If impacts to depleted stocks cannot be assessed because of lack of WDFW funding or unwillingness by industry to support agreed costs, specific non-treaty fisheries will be appropriately restricted, depending on a resource risk and uncertainty assessment to be completed by WDFW. Alternatively, available harvest opportunities will be preferentially allocated to those fisheries that have adequate monitoring or the least risk of not meeting management objectives.

5. Transformation of fishery gear and methods to optimize differential harvest

WDFW is optimistic that current commitments from the non-treaty fishing industry for collaborative development of expanded selective fishery methods will be successful. However, if such efforts do not occur to develop improved gears and methods to appropriately protect depleted species and stocks while harvesting healthy populations, then WDFW will likely develop incentives which allocate harvest opportunity based on a fishery's ability to minimize impacts on non-target species and/or provide similar incentives. If such incentive approaches do not produce needed changes in the fishery, WDFW will continue to regulate and restrict fishing opportunity consistent with stock protection needs and prevailing harvest approaches.

ESA Compliance Strategy

Initial recovery plan frameworks and associated 4(d) rule proposals for harvest, hatcheries and assessment activities will be completed in 1999 for Puget Sound chinook and Hood Canal/Strait of Juan de Fuca summer chum in cooperation with NMFS and the tribes. Additional conservation planning activities leading to expected 4(d) rule proposals by NMFS in 1999 include upper Columbia River steelhead (associated with delisting of hatchery steelhead component) and lower Columbia River steelhead.

Section 10 permits will need to be obtained for incidental takes in those areas where 4(d) rules are not in place, which currently includes any activities affecting listed (or soon to be listed) steelhead, chinook and coastal cutthroat ESUs in the Columbia River. In addition the harvest, hatchery and assessment elements of watershed recovery plans will be completed in the year 2000 for Nooksack, Dungeness and Elwha chinook within Puget Sound. These plans/rules will include specific limitation on harvest impacts for listed stocks.